

From: noreply@wsu.edu
To: [curriculum.submit](#)
Subject: 586234 Materials Science and Engineering Requirements Revise - Revise or Drop Graduate Certificate
Date: Monday, June 1, 2020 10:55:25 AM
Attachments: [2020.06.01.10.52.55.68.FormData.html](#)
[2020.06.01.10.52.54.22.currentCatalogFile_ModNuclear_MSandE_Certificate_REV.DOC](#)

Scott Beckman has submitted a request for a major curricular change. His/her email address is: scott.beckman@wsu.edu.

Requested change: Revise or Drop Graduate Certificate

Title: Nuclear Materials

New Title: Nuclear Materials, Science, & Engineering

Requested Effective Date: Fall 2021

Revise certificate requirement: Yes

Dean: Gloss, Lisa - Dean - Graduate School - MSE Graduate,

Chair: McCloy, John,

_____	_____	_____
Catalog Subcommittee Approval Date	AAC, PHSC, or GSC Approval Date	Faculty Senate Approval Date

From: [McCloy, John Stuart](#)
To: [curriculum.submit](#)
Subject: RE: 586234 Materials Science and Engineering Requirements Revise - Revise or Drop Graduate Certificate
Date: Thursday, July 30, 2020 3:30:51 PM

approve

From: curriculum.submit
Sent: Thursday, July 30, 2020 2:09 PM
To: McCloy, John Stuart <john.mccloy@wsu.edu>
Subject: FW: 586234 Materials Science and Engineering Requirements Revise - Revise or Drop Graduate Certificate

Dr. McCloy,

I don't believe that you received the below and attached proposal, as our form system did not have your correct email address. Please indicate if you approve this action.

Thank you,
Blaine

Blaine Golden, Assistant Registrar
Curriculum, Graduations, Athletic Eligibility

From: noreply@wsu.edu <noreply@wsu.edu>
Sent: Monday, June 1, 2020 10:53 AM
To: curriculum.submit <curriculum.submit@wsu.edu>
Subject: 586234 Materials Science and Engineering Requirements Revise - Revise or Drop Graduate Certificate

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Chair: McCloy, John,

From: [Gloss, Lisa M](#)
To: [curriculum.submit](mailto:curriculum.submit@wsu.edu); john.mccloy@wsu.edu
Subject: Re: 586234 Materials Science and Engineering Requirements Revise - Revise or Drop Graduate Certificate
Date: Tuesday, June 2, 2020 1:32:48 PM

1. I approve this proposal in its current form.

Lisa Gloss

Dr. Lisa M. Gloss
Dean, Graduate School
Associate professor, School of Molecular Biosciences
Washington State University
Pullman, WA 99164-1030
TEL (509) 335-5859

From: "curriculum.submit@wsu.edu" <curriculum.submit@wsu.edu>
Date: Monday, June 1, 2020 at 10:55 AM
To: "john.mccloy@wsu.edu" <john.mccloy@wsu.edu>
Cc: Lisa Gloss <lmgloss@wsu.edu>
Subject: 586234 Materials Science and Engineering Requirements Revise - Revise or Drop Graduate Certificate

McCloy, John,

Gloss, Lisa - Dean - Graduate School - MSE Graduate,

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Requested change: Revise or Drop Graduate Certificate

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Both Chair and Dean approval is required to complete the submission process. Please indicate that you have reviewed the proposal by highlighting one of the statements below and **reply all** to this email. (curriculum.submit@wsu.edu.) [Details of major change requested can be found in the attached supplemental documentation]

1. I approve this proposal in its current form.

RATIONALE STATEMENT

The proposed changes broaden the scope, enabling us to better serve the needs of the state. The stakeholders, in particular WSU Tricities and the industries serving the nuclear science community in WA, have voiced a desire for these changes to facilitate the ongoing education of their workforce. The changes involve modifying the name of the certificate, the addition of other nuclear science and engineering courses for the requirements, and changing the faculty point of contact. The existing certificate can be found at:

<https://gradschool.wsu.edu/degrees/factsheet/graduate-certificate-in-nuclear-materials/>

The proposed changes can be seen in the following document, listed using the Microsoft track changes tool.

Further, we request the certificate's fact sheet be updated. We have noticed that not only are the requirements out of date, but also many of the participating faculty listed are no longer members of WSU. (Some have been gone for over five years.)

GRADUATE CERTIFICATE PROGRAM
IN
NUCLEAR MATERIALS, SCIENCE, & ENGINEERING

Materials Science and Engineering Program (MSEP)

1. Statement of Need

This certificate program will benefit students who wish to pursue employment opportunities in the multifaceted nuclear industry. The northwest United States has long been a hub of research and industrial activity in nuclear science. This includes the Tri-Cities region, which is a center for nuclear industry employment and the site of the Hanford Nuclear Reservation, the Columbia Generating Station (currently the only operating commercial plant in the northwest), the largest nuclear waste treatment project in the nation, and Pacific Northwest National Laboratory (PNNL – a multiprogram laboratory of the Department of Energy). PNNL has recently expanded its infrastructure capabilities in nuclear materials and is actively developing nuclear materials characterization capabilities at its Radiochemical Processing Lab. Additionally, the new WSU-PNNL Joint Institute of Nuclear Science and Technology (INST) demonstrates the commitment of WSU to nuclear research and education.

The Tri-Cities also hosts several business in nuclear fuels (ArevaFramatome) and nuclear medical isotopes (IsoRay). Not to be ignored is the significant nuclear reactor design expertise found at Idaho National Laboratory (INL), in Idaho Falls. At the same time, WSU has significantly grown training and research opportunities for graduate and undergraduate students enabled by Department of Energy investments in WSU's Nuclear Radiation Science Center, one of a few university research reactors in the nation, and major growth of the Radiochemistry research emphasis within the Department of Chemistry.

The Graduate Certificate in Nuclear Materials, Science, & Engineering provides formal academic coursework to scientists and engineers whose primary training is in a non-nuclear discipline; statistics show that only a small portion of scientists and engineers employed in the nuclear industry, ~5%, have a nuclear degree. Thus this certification program addresses the needs and expectations of the current industry.

2. Program Requirements

Graduate certificate programs are designed for part-time study without formal admission to a degree program. Part-time students admitted to a certificate program will be classified as “Not-Advanced-Degree-Candidate” (NADC), meaning a student with a baccalaureate degree who wishes to take graduate courses but does not wish to pursue a graduate degree. This classification is defined in more detail in the Graduate School *Policies & Procedures*. Students currently enrolled in regular graduate degree programs at WSU (master's or doctoral) may concurrently enroll in graduate certificate programs with the approval of their committee. To qualify as a part-time certificate student, a prospective student must:

- Have a bachelor's degree from an accredited post-secondary institution.
- Meet all prerequisite course requirements or be able to demonstrate equivalent knowledge and understanding for courses prior to enrollment.
- Complete the on-line Graduate School application form ~~prior to enrollment in their first course (indicating their interest in a certificate program)~~, pay the appropriate application fee, and submit the required application material ~~of our School~~.

- Maintain the requirements to be a student in good standing in the Graduate School and MSEP program while enrolled as a certificate student.

The maximum time allowed for completion of a certificate is 6 years from the beginning date of the earliest course applied toward the certificate. Extensions may be granted on a case-by-case basis.

3. Statement of Resources

The Graduate Certificate Program in Nuclear Materials, Science, & Engineering primarily draws upon the existing resources of the Materials Science and Engineering Program (MSEP) and also includes the School of Mechanical and Materials Engineering and Chemistry Department.

We expect this program to be desirable to traditional students in addition to those who are working professionals in the region's nuclear industries. Course offerings from the graduate certificate program will be made available on the AMS system and/or on streaming video when possible. Courses may be offered late in the day or evening to accommodate working professionals.

4. Description of Curriculum

These course offerings will address the following key components:

- Fundamental nuclear science and engineering
- Radiochemistry
- Reactor operation and engineering
- Safety
- Waste management

To obtain the certificate, students must complete a minimum of nine credits from the following list of courses, six of which must be at the graduate level. No S/F courses will be used or counted for the certificate; a grade B or higher is required in each course counting towards the certificate.

To receive the certificate, students must submit an *Application for Graduation for Graduate Certificate* with the appropriate signatures, pay a fee, and submit it to the Graduate School when the certificate coursework has been completed.

- **ME 461/ CHE 461 Introduction to Nuclear Engineering** (3 credits). A broad introduction: applied nuclear physics, application to the nuclear fuel cycle and reactor core design, systems and safety.
- **ME 462 Introduction to Nuclear Engineering II** (3 credits) Fundamentals of nuclear engineering, heat deposition and removal from nuclear reactors, radiation protection, radiation shielding, and licensing, safety, and environmental aspects of nuclear reactor operation.
- **ME 565 Nuclear Reactor Engineering** (3 credits). Nuclear reactor design problems in thermodynamics, fluid flow, heat transfer, fuel preparation, waste disposal, materials selection; discussion of reactor types. Nuclear power plant licensing and related topics will also be introduced and discussed.
- **ME 579 ~~Special-Advanced~~ Topics in Mechanical Engineering** (typically 3 credits)~~:- Topics offered related to nuclear engineering. Topics in Nuclear Engineering (3credits). Topics include: nuclear materials, nuclear fuel cycle, technology of fusion energy, and nuclear safeguards and security.~~
- **MSE 503 ~~Current-Advanced~~ Topics in Materials Science and Engineering** (typically 3 credits). Topics offered related to nuclear materials, science, and engineering. E.g. Glass Science and Technology.~~:- Glass Science and Technology (3 credits). A broad overview of the current~~

~~state of knowledge in Glass Science & Technology. From windows to drinking glasses, from optical fiber to cell phone and computer displays and nuclear waste immobilization, glass is ubiquitous in our lives and has changed human history multiple times.~~

- **Chem 490 ~~Current Topics in Chemistry~~ ~~Reactor Operator Training~~** (1 typically 3 credits). ~~Topics related to nuclear chemistry and materials. E.g. Reactor Operator Training.~~ The essential subject matter needed to take the nuclear Reactor Operator licensing examination, which is administered by the U.S. Nuclear Regulatory Commission. Materials includes basic reactor physics, nuclear reactions, health physics and radiation safety, nuclear fuel behavior, nuclear reactor control systems, plant operations and regulatory compliance. The intended outcome is for the candidate to take the U.S. NRC examination to become a licensed Nuclear Plant Reactor Operator for the WSU research reactor.
- **Chem 521/522 Radiochemistry and Radiotracers** (2 credits with 1 credit lab). The courses provide understanding on basic radiochemistry and nuclear chemistry, including, but not limited to, concepts on nuclear stability, decay modes and kinetics, interactions of radiation with matter, radioanalytical instrumentation, health physics, radiolysis, neutron activation, and chemistry at tracer levels.
- **Chem 529 Selected Topics in Analytical Chemistry: ~~Solution Chemistry for Nuclear Processes~~** (typically 3 credits) ~~Topics related to nuclear chemistry and materials. E.g. Solution Chemistry for Nuclear Materials. A high level overview of the essential features of reactions occurring in condensed liquid phases, emphasizing aqueous and organic media, and biphasic liquid-liquid extraction systems.~~
- **Chem 550 Special Topics in Nuclear Processes and Radioactive Waste Management** (1-3 credits) ~~May be repeated for credit. Prereq permission of instructor. E.g.,~~ Fundamental chemistry of the nuclear industry, chemical processing and waste management.
- Other suitable courses with substantial focus on Nuclear Materials, Science, and Engineering may be allowed at the discretion of the certificate point of contact.

Contact person:

~~Professor Natalie Wall~~

~~Department of Chemistry~~

~~Washington State University~~

~~Ph. (509) 335-8917~~

~~Email. nawall@wsu.edu~~

~~Professor John McCloy~~

~~School of Mechanical and Materials Engineering~~

~~Washington State University~~